

[Title:- APPARATUS FOR DISCHARGING SLIDE FASTENERS
WITH SLIDERS MOUNTED THEREON

[Description:-]

The present invention relates generally to the
5 production of slide fasteners having sliders mounted
respectively thereon, and more particularly to an
apparatus for discharging such slide fasteners
successively out of a slide-fastener processing or
finishing machine.

10 As shown in Japanese Patent Laid-open
Publication Nos. 59-103610 and 58-127604 and
reillustrated respectively here in Figures 13 and 14,
it has been a conventional practice to discharge
finished slide fasteners F successively either in a
15 horizontal direction or in a vertical direction from a
slide-fastener processing or finishing machine by means
of a pair of discharge rollers. One of the discharge
rollers A or B has an annular recessed portion or
groove C or D for receiving an upper portion of each
20 slider including a pull tab to prevent the slider and
its pull tab from being deformed or otherwise damaged
by the discharge rollers when the slide fasteners are
discharged from the discharged rollers.

The conventional slide-fastener discharging
25 apparatus having such discharge rollers are
disadvantageous in that the sliders are likely to be
trapped in the annular groove C, D in the discharge

roller A, B when the slide fasteners F are discharged from the discharge rollers. Such trapped sliders move along with the grooved discharge roller A, B with the result that a smooth discharge of the slide fasteners F is difficult to achieve. This tendency becomes greater when the slide fastener F includes a slider S having a large-sized heavy pull tab T1 (Figure 11) or a pull tab T2 having a hook-shaped free end (Figure 12).

It is believed possible by means of the present invention to provide an apparatus for discharging the slide fasteners smoothly in succession along a longitudinal path.

It is further believed possible by means of the present invention to provide a slide-fastener discharging apparatus having structural features which enable a slider to pass smoothly through a pair of discharge rollers of the apparatus when each slide fastener is discharged from the discharge rollers.

According to the present invention there is provided an apparatus for discharging slide fasteners having sliders mounted respectively thereon, comprising:

(a) a cooperating pair of discharge rollers for discharging the slide fasteners successively along a longitudinal path, at least one of said discharge rollers having in its periphery an annular recessed portion for receiving the sliders when the slide fasteners are discharged from said pair of discharge rollers; and

(b) a slider guide member non-rotatably disposed in said annular recessed portion of said one discharge roller and having an elongate guide portion extending from an upstream side of said one discharge roller toward a downstream side of the latter in
5 confronting relation to the other roller for guiding the sliders downstream of said one discharge roller as the sliders are fed through said annular recessed portion.

10 The invention will be described by way of example with reference to the accompanying drawings, wherein:-

Figure 1 is a fragmentary perspective view, with parts cut away for clarity, of a slide-fastener discharging apparatus according to the present
15 invention;

Figure 2 is an axial cross-sectional view of one of a pair of discharge rollers of the slide-fastener discharging apparatus;

Figure 3 to 7 are fragmentary
20 cross-sectional, partly front elevational views showing the manner in which a slide fastener with a slider mounted thereon is progressively discharged from the

slide-fastener discharging apparatus;

Figure 8, appearing with Figure 2, is an enlarged fragmentary side elevational, partially cross-sectional view of Figure 6;

5 Figures 9A and 9B are views similar to Figures 2 and 6, respectively, but showing a modified slide-fastener discharging apparatus;

Figures 10A and 10B are views similar to Figures 2 and 6, respectively, but showing another modified
10 slide-fastener discharging apparatus;

Figure 11 is a fragmentary perspective view of a slide fastener to be discharged by the apparatus shown in Figure 1, the slide fastener including a slider having a large-sized heavy pull tab;

15 Figure 12 is a view similar to Figure 12, but showing a slider pull tab having a hook-shaped free end;

Figure 13 is a fragmentary front elevational view, partly in cross section, of a conventional
20 slide-fastener discharging apparatus; and

Figure 14 is a fragmentary side elevational view of another known slide-fastener discharging apparatus.

Figures 1 to 8 show an apparatus 20 for discharging finished slide fasteners F successively out
25 of a slide-fastener processing or finishing machine (only partially indicated by phantom lines in Figure 1).

The apparatus 20 includes a pair of upper and lower discharge rollers 21, 22 for discharging the slide fasteners F one after another along a horizontal longitudinal path. The discharge rollers 21, 22 have
5 respective peripheral portions made of resilient hard synthetic rubber so that they can firmly grip therebetween the individual slide fastener F without damaging the same.

The upper discharge roller 21 is rotatably
10 mounted on a frame 23 and driven by a suitable drive means (not shown) to rotate counterclockwise in Figure 1. The lower discharge roller 22 is rotatably mounted on a shaft 24 supported by and extending between a pair of opposed arms of a U-shaped roller holder 25. The
15 roller holder 25 is connected to a piston rod 26 of a fluid-actuated cylinder (not shown). The lower discharge roller 22 is normally spaced from the upper discharge roller 21 and, upon operation of the cylinder, it is brought into frictional engagement with
20 the upper discharge roller 21 for corotation therewith. As best shown in Figure 2, the lower discharge roller 22 has a central annular recessed portion or groove 27 extending in and along its peripheral surface for receiving an upper portion (directed downwardly in
25 Figure 1) of a slider S including a pull tab P (Figure 1) while the respective slide fastener F is being discharged by the discharge rollers 21, 22.

The slide-fastener discharging apparatus 20 further includes a slider guide member 28 non-rotatably associated with the lower discharge roller 22 and disposed in the annular recessed portion 27 of the latter for guiding the upper portion of the respective slider S toward a downstream side of the lower discharge roller 22. The slider guide member 28 comprises a strip of resilient sheet material, such as spring steel bent into a generally D-shape and has a width slightly smaller than the width of the annular recessed portion 27 of the lower discharge roller 22. The D-shaped slider guide member 28 extends circumferentially around, and through the space formed by, the annular recessed portion 27 and movably rests on the periphery of the latter 27. The slider guide member 28 includes a curved elongate guide portion 29 extending from an upstream side of the lower discharge roller 22 toward a downstream side of the latter in confronting relation to the upper discharge roller 21, the guide portion 29 terminating in a discharge portion 30 projecting outwardly beyond the periphery of the lower discharge roller 22. The discharge portion 30 is disposed immediately above an inlet portion of a discharge chute 31 disposed downstream of the lower discharge roller 22. The guide portion 29 further has an arcuate inlet portion 32 extending substantially concentric with the periphery of the annular recessed portion 27. Thus, the guide portion 29 has a

varying curvature progressively increasing and then decreasing in a direction from the inlet portion 32 toward the discharge portion. The guide member 28 further includes a pair of end portions contiguous to the inlet and discharge portions 32, 30, respectively, and extending convergently toward each other. The opposite ends of the strip or guide member 28 are connected together by a bolt-and-nut fastener 33 so that the slider guide member 28 is detachable from the lower discharge roller 22. The slider guide member 28 may be replaced by another slider guide member constructed to suit with the structure of a slider mounted on the respective slide fastener finished by the slide-fastener finishing machine. As described above, the D-shaped slider guide 28 is rested on the periphery of the annular recessed portion 27 of the lower discharge roller 22 but it is held in interlocking engagement with the roller holder 25 against corotation with the lower discharge roller 22.

20 The operation of the apparatus 20 is described below with reference to Figures 3 through 7 taken in conjunction with the operation of the slide-fastener finishing machine.

25 As shown in Figures 1 and 3, a freshly finished slide fastener F is supplied by a pair of reciprocable grippers 34, 34 (Figure 1) from the slide fastener finishing machine to the slide fastener discharging

apparatus 20. In this instance, the lower discharge roller 22 is held in its non-operating position remote from the upper discharge roller 21. The grippers 34 are moved downstream along along respective pairs of guide rails 35, 35 until a leading end of the slide fastener F passes the discharge rollers 21, 22. Then the cylinder is actuated to extend its piston rod 26, thereby causing the lower discharge roller 22 to press the slide fastener F against the upper discharge roller 21. Thus the slider fastener F is firmly gripped between the upper and lower discharge rollers 21, 22, as shown in Figure 4. The grippers 34 release the slide fastener F and then they are moved along the guide rails 35 away from the discharge rollers 21, 22 for gripping a leading end of the next succeeding finished slide fastener. Then the upper discharge roller 21 is rotated to feed the slide fastener F downstream of the discharge rollers 21, 22 whereupon the slide fastener F supplied to the discharge chute 31 while being guided by the discharge end 30 of the slider guide member 28, as shown in Figure 5. During that time, the lower discharge roller 22 rotates clockwise in the same figure due to the frictional engagement with the slide fastener F.

Continuous rotation of the discharge rollers 21, 22 causes a slider S of the slide fastener F to enter the annular recessed portion 27 and then to move into the nipping point between the discharge rollers 21, 22.

During that time, the slider S is guided on and along the guide portion 29 of the slider guide member 28 (Figure 8) and, due to the friction between the slider S and the guide portion 29, the slider guide member 28 is displaced toward the discharge chute 31 (Figure 6). As the slide fastener F is further advanced by the discharge rollers 21, 22, the slider S slides smoothly from the nipping point toward the discharge portion 30 along the guide portion 29 and then it is discharged from the discharge portion 30 onto the discharge chute 31, as shown in Figure 7. Due to the resiliency of the slider guide member 28, the slider S is positively discharged out of the annular recessed portion 27. After the slide fastener F has been fully discharged to the discharge chute 31, the rotation of the upper discharge roller 21 is stopped and the lower discharge roller 22 is returned to its non-operating position of Figure 3 for a subsequent cycle of discharging operation.

Figures 9A and 9B show a modified slider guide member 28a made of a strip of resilient sheet material bent into a generally D-shape. This guide member 28a is structurally the same as the guide member 28 of the foregoing embodiment with the exception that the D-shaped guide member 28a is secured to the roller holder 25 such that it is not rested on but spaced radially outwardly from the periphery of the annular

recessed portion 27 of the lower discharge roller 22. Due to such spaced disposition, the guide member 28a is free from abrasive wear on its inner surface and has a higher resiliency than that of the guide member 28. The guide member 28a is held out of engagement with the annular recessed portion 27 throughout the slide fastener discharging operation.

Another modified slider guide member 28b shown in Figures 10A and 10B is also made of a strip of resilient sheet material but the resilient strip is bent into a generally L-shape. The L-shaped guide member 28b is secured at its one end to the roller holder 25 and extends from an upstream side of the discharge roller 22 toward a downstream side of the same along a part of the full circumference of the annular recessed portion 27 in radially outwardly spaced relation to the latter, substantially entirely covering the upstream side (i.e. the upper left quadrant in Figures 10A and 10B) of the annular recessed portion 27. This guide member 28b is simple in construction and can be manufactured less costly.

Obviously, many modifications and variations of the present invention are possible in the light of the above teachings. For instance, the annular recessed portion 27 may be provided in the upper discharge roller 21 so that the slide fasteners F can be discharged with the upper portion of the respective sliders S facing either upwards or downwards. The upper and lower discharge rollers 21, 22 may be

disposed in close juxtaposition provided that the
respective slide fastener F is pushed toward the
discharge rollers 21, 22 by means of a pusher arm (not
shown), instead of being drawn by the reciprocable
5 grippers 34, 34.

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CLAIMS:

1. An apparatus for discharging slide fasteners having sliders mounted respectively thereon, comprising:

5 (a) a cooperating pair of discharge rollers for discharging the slide fasteners successively along a longitudinal path, at least one of said discharge rollers having in its periphery an annular recessed portion for receiving the sliders when the slide
10 fasteners are discharged from said pair of discharge rollers; and

(b) a slider guide member non-rotatably disposed in said annular recessed portion of said one discharge roller and having an elongate guide portion
15 extending from an upstream side of said one discharge roller toward a downstream side of the latter in confronting relation to the other roller for guiding the sliders downstream of said one discharge roller as the sliders are fed through said annular recessed
20 portion.

2. An apparatus according to claim 1, said elongate guide portion extending through the space formed by said annular recessed portion and having a discharge portion projecting outwardly beyond the periphery of said
25 one discharge roller.

3. An apparatus according to claim 2, further including a chute disposed downstream of said discharge



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rollers and having an inlet portion disposed below said discharge portion of said elongate guide portion.

4. An apparatus according to claim 2 or 3, said curved elongate guide portion further having an inlet
5 portion extending substantially concentric with the periphery of said annular recessed portion.

5. An apparatus according to claim 4, said elongate guide portion having a varying curvature progressively increasing/decreasing in a direction from said inlet
10 portion toward said discharge portion.

6. An apparatus according to claim 1, said slider guide member comprising an elongate strip of resilient sheet material.

7. An apparatus according to claim 1, said
15 slider guide member comprising an elongate strip of sheet material bent into a generally D-shape and extending circumferentially around said annular recessed portion.

8. An apparatus according to claim 7, said
20 D-shaped slider guide member resting on the periphery of said annular recessed portion.

9. An apparatus according to claim 7, said D-shaped slider guide member being spaced radially outwardly from the periphery of said annular recessed
25 portion.

10. An apparatus according to claim 1, said slider guide member comprising an elongate strip of



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sheet material bent into a generally L-shape extending along a part of the full circumference of said annular recessed portion.

11. An apparatus according to claim 10, said
5 L-shaped slider guide member being spaced radially outwardly from the periphery of said annular recessed portion.

12. An apparatus according to claim 7, said
slider guide member comprising an elongate strip of
10 resilient sheet material.

13. An apparatus according to claim 1, further including a roller holder for rotatably supporting thereon said one discharge roller, said slider guide member being held into interlocking engagement with
15 said roller holder against corotation with said one discharge roller.

14. An apparatus according to claim 13, said
slider guide member comprising an elongate strip of sheet material bent into a generally D-shape and
20 extending circumferentially around and retained on the periphery of said annular recessed portion.

15. An apparatus according to claim 14, said
D-shaped slider guide member being displaceable toward said downstream side of said one discharge roller in
25 response to the engagement of the sliders with said elongate guide portion of said slider guide member.

16. An apparatus according to claim 13, said



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slider guide member comprising a curved elongate strip
of sheet material extending in

spaced relation to the periphery of said annular
5 recessed portion, said slider guide member being
secured to said roller holder.

17. An apparatus according to claim 16, said
slider guide member having a generally D-shape disposed
circumferentially around said annular recessed portion.

10 18. An apparatus according to claim 13, said
slider guide member having a generally L-shape and being
connected at its one end to said roller holder and
substantially entirely covering an upstream side of the
periphery of said annular recessed portion.

15 19. An apparatus according to claim 1, each of
said discharge rollers having a peripheral portion made
of a resilient hard synthetic rubber.

20. An apparatus substantially as described with reference
to and as illustrated in Figures 1 to 8 of the accompanying drawings.

20 21. An apparatus substantially as described with reference
to and as illustrated in Figures 1 to 8 modified as in Figures 9A and
9B of the accompanying drawings.

22. An apparatus substantially as described with reference
to and as illustrated in Figures 1 to 8 modified as in Figures 10A and
25 10B of the accompanying drawings.
